

Notes on *Walckenaeria* species (Araneae: Linyphiidae) from China

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Notes on *Walckenaeria* species (Araneae: Linyphiidae) from China. -

Results of a survey of the erigonine genus *Walckenaeria* in China are presented. The name *W. cylindrica* Xu, 1994 is placed in the synonymy of *Paikiniana mira* (Oi, 1960). *W. ferruginea* Seo, 1991 is removed from the synonymy of *W. orientalis* (Oligier, 1985) and its female is described for the first time. The type specimens of *W. yunnanensis* Xia *et al.*, 2001 are re-examined. Descriptions of *W. dahaituoensis* sp. n. and *W. asymmetrica* sp. n., and redescrptions of *W. karpinskii* (O. P.-Cambridge, 1873), *W. ferruginea* and *W. yunnanensis* are provided. A total of ten *Walckenaeria* species are currently known from China.

Keywords: Taxonomy - revalidation - type - new synonym - new species.

INTRODUCTION

The widely distributed linyphiid spider genus *Walckenaeria* was erected by Blackwall (1833) for the European species *W. acuminata* Blackwall, 1833 and *W. cuspidata* Blackwall, 1833. The original spelling of the name was given as above, but Blackwall emended it to *Walckenaera* in 1841. According to the rules of the International Commission on Zoological Nomenclature, the original spelling must stand and this was adopted by recent authors.

During the past 175 years a considerable number of *Walckenaeria* species have been described. Furthermore some revisional studies of this genus were done by Wunderlich (1972), Millidge (1983), Holm (1984) and Bosmans & De Smet (1993). So far, a total of 193 species were recorded from all over the world (Platnick, 2010). As most erigonines, *Walckenaeria* species live mostly at ground level, often in damp habitats, though some, as adults, may move up to low shrubs (Millidge, 1983). A completely eyeless *Walckenaeria* species was found in a limestone cave of central Kyushu, southwestern Japan (Saito & Irie, 1992).

A total of seven species were up to now reported from China: *W. antica* (Wider, 1834), *W. clavicornis* (Emerton, 1882), *W. cylindrica*, *W. karpinskii*, *W. nodosa* O. P.-Cambridge, 1873, *W. vigilax* (Blackwall, 1853) and *W. yunnanensis*. Our examination of the holotype of *W. cylindrica* (deposited in JLU) and a paratype and the allotype of *Paikiniana mira* (deposited in NSMT) proved that *W. cylindrica* is a junior synonym of *P. mira*. Our recent survey of collections showed a total of 10 *Walckenaeria* species present in China. Here we re-describe *W. karpinskii* in order to provide details of intra-specific variation, and *W. yunnanensis* because of the poor illustrations of its original description.

MATERIAL AND METHODS

The spider material used for this study is deposited in the following institutions: IZCAS Institute of Zoology, Chinese Academy of Sciences, Beijing, China; JLU Jilin University, Changchun, China; MHNG Muséum d'histoire naturelle de Genève, Switzerland; NSMT National Museum of Nature and Science, Tokyo, Japan.

For each species only the original description and new misidentifications are listed. Synonyms listed in the spider catalog of Platnick (2010) are not repeated here. Locality names and distribution data are given according to current Chinese standard (Peng *et al.*, 2003).

Specimens were examined using an Olympus-SZ11 stereomicroscope and illustrated using an Olympus-BX41 compound microscope equipped with a drawing tube. Left male palps and female epigyna were illustrated after being separated from the body. Embolic divisions were dissected from the palpal bulb using sharp pins and forceps. Genital organs were immersed in 75% alcohol and examined under a compound microscope; embolic divisions and vulvae were mounted in Hoyer's Solution and examined in strong transmitted light against a white background. In addition, the ventral tegument of epigyna was removed by sharp pins and forceps to study the duct system of the vulvae under a compound microscope.

Eye diameters were measured at their widest extent. Leg measurements are given as: Total length (femur, patella, tibia, metatarsus, tarsus). All measurements are in millimeters. The terminology of genitalic structures follows Hormiga (2000) and Tanasevitch (2006).

The following abbreviations of somatic morphology and genitalic structures are used in the text and in the figures:

Somatic morphology: ALE, anterior lateral eye; AME, anterior median eye; PLE, posterior lateral eye; PME, posterior median eye; Tm I, position of trichobothrium on metatarsus I; Tm II, position of trichobothrium on metatarsus II; Tm IV, position of trichobothrium on metatarsus IV.

Male palp: C, column; DSA, distal suprategular apophysis; E, embolus; L, lamella; MM, median membrane; PC, paracymbium; PT, protegulum; PTA, prolateral tibial apophysis; R, radix; RBP, retrobasal cymbial process; RTA, retrolateral tibial apophysis; SPT, suprategulum; ST, subtegulum; T, tegulum; TP, tailpiece of radix.

Epigynum: CD, copulatory duct; CO, copulatory opening; DP, dorsal plate; DPS, dorsal plate scape; FD, fertilization duct; FO, fertilization opening; S, spermatheca; VP, ventral plate.

RESULTS

Walckenaeria asymmetrica sp. n.

Figs 1-2

HOLOTYPE: IZCAS, without registration number; ♂; China, Henan Province, Nanyang City, Baotianman National Nature Reserve (33.32°N 112.20°E); collected by Q. Wang and Y. Lin; collected on 12.11.2005.

PARATYPES: IZCAS (1 ♀) and MHNG (1 ♀ 1 ♂), without registration number; same data as for holotype.

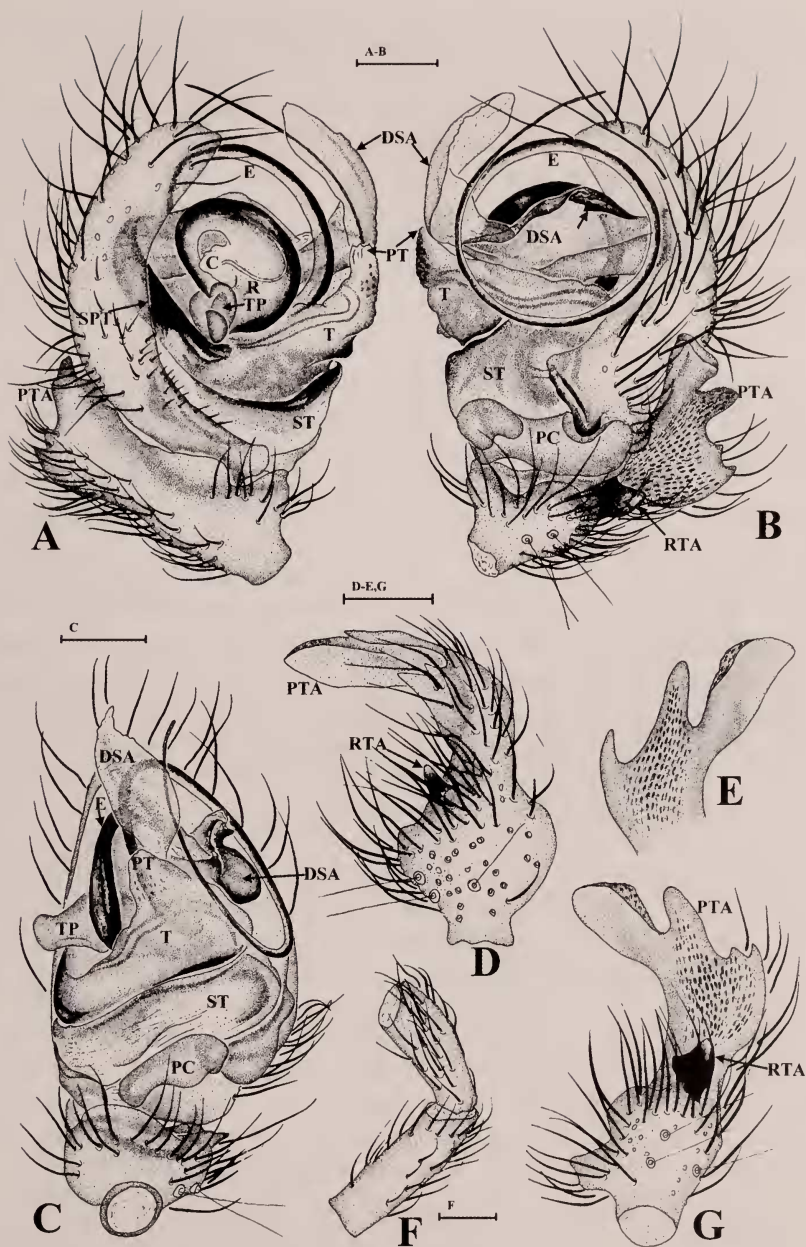


FIG. 1

Walckenaeria asymmetrica sp. n.; male holotype. (A) Distal part of left palp, prolateral view. (B) Same, retrolateral view (arrow indicating small triangular apophysis on upper margin of supra-tegulum). (C) Same, ventral view. (D) Tibia of left palp, dorsal view. (E) Distal part of tibia of right palp, lateral view. (F) Patella and femur of left palp, retrolateral view. (G) Tibia of left palp, lateral view. Scale lines: 0.1 mm.

DIAGNOSIS: The new species is similar to *W. chiyokoae* Saito, 1988, but the male can be distinguished by the shape of the prolateral apophysis of the palpal tibia, which is composed of 4 or 3 branches in *W. asymmetrica* (Fig. 1E, G), but only 2 in *W. chiyokoae*; by the strongly sclerotized dentiform retrolateral apophysis of the palpal tibia in *W. asymmetrica* (Fig. 1G) versus a slightly sclerotized rectangular apophysis in *W. chiyokoae*; by a long and strongly curved tailpiece in *W. chiyokoae*, but a shorter and more straight one in *W. asymmetrica* (Fig. 1A, C); by the different ratio of the length of the embolus to the length of the cymbium (about 3.9 in *W. asymmetrica* and 4.9 in *W. chiyokoae*). The female is extremely similar to that of *W. chiyokoae*, except for the relatively straight and undeveloped anterior part of the copulatory ducts, and females cannot be safely identified unless collected together with males.

DESCRIPTION OF MALE HOLOTYPE: Total length 2.14. Carapace 1.05 long, 0.78 wide, light orange. Head raised into a lobe carrying posterior median eyes (Fig. 2B); a conspicuous sulcus running back from behind PLE and containing a small pit anteriorly (Fig. 2B). Clypeus 0.21 high, with a patch of hairs in the ocular area and on the clypeus (Fig. 2B). AME diameter 0.05, ALE 0.08, PME 0.10, PLE 0.08, AME interdistance 0.31 times their diameter, AME-ALE interdistance 0.67 times ALE diameter, PME interdistance 1.06 times their diameter, PME-PLE interdistance 2.52 times PLE diameter. Sternum 0.59 long, 0.57 wide. Coxa IV interdistance 1.19 times their width. Chelicera light orange, with 4 promarginal and 2 retromarginal teeth (Fig. 2C). Tibia of leg I 8.94 times longer than deep. Tm I 0.53, Tm IV present. Tibiae of all legs with very short spines and their length almost half of the width of tibiae. Number of dorsal spines on tibiae of legs I-IV: 1-1-1-1. Leg measurements: I 3.56 (1.02, 0.30, 0.95, 0.78, 0.51); II 3.38 (0.96, 0.29, 0.89, 0.76, 0.49); III 2.84 (0.81, 0.29, 0.68, 0.66, 0.41); IV 3.70 (1.03, 0.30, 0.98, 0.91, 0.49).

Palp: Patella a bit shorter than femur (Fig. 1F). Tibia short, armed with 1 strongly sclerotized, dentiform retrolateral apophysis and 1 large prolateral apophysis with scaly inner surface and distal margin with 3 (right male palp) or 4 (left male palp) branches; with 1 prolateral and 2 retrolateral trichobothria (Fig. 1D). Paracymbium C-shaped, basal part folded downwards (Fig. 1B). Tegulum distal to subtegulum in unexpanded palp (Fig. 1B). Protegulum with some un conspicuous papillae (Fig. 1A, B). Distal suprategular apophysis well developed, ending in a cavity accommodating distal one-sixth of long coiled embolus; with a broad groove retrolaterally and bearing a small tooth on the upper side (Fig. 1B, C). Embolic division very simple. Embolus very long (about 1.5 cm), with a narrow membrane along inner margin. Tailpiece short, twisted clockwise in prolateral view, ending in a lobe in ventral view (Fig. 1A).

DESCRIPTION OF FEMALE PARATYPE (IZCAS): Carapace (Fig. 2A) unmodified, similar to that of male in coloration. Total length 2.27. Carapace 0.94 long, 0.78 wide. Clypeus 0.18 high. AME diameter 0.06, ALE 0.09, PME 0.08, PLE 0.08, AME interdistance 0.26 times their diameter, AME-ALE interdistance 0.38 times ALE diameter, PME interdistance 0.36 times their diameter, PME-PLE interdistance 0.42 times PLE diameter. Sternum 0.59 long, 0.59 wide. Coxa IV interdistance 0.77 times their width. Chelicera with 4 promarginal and 2 retromarginal teeth. Tibia of leg I 6.52 times longer than deep. Tm I 0.52, Tm IV present. Length of spine on tibiae of all legs almost equal

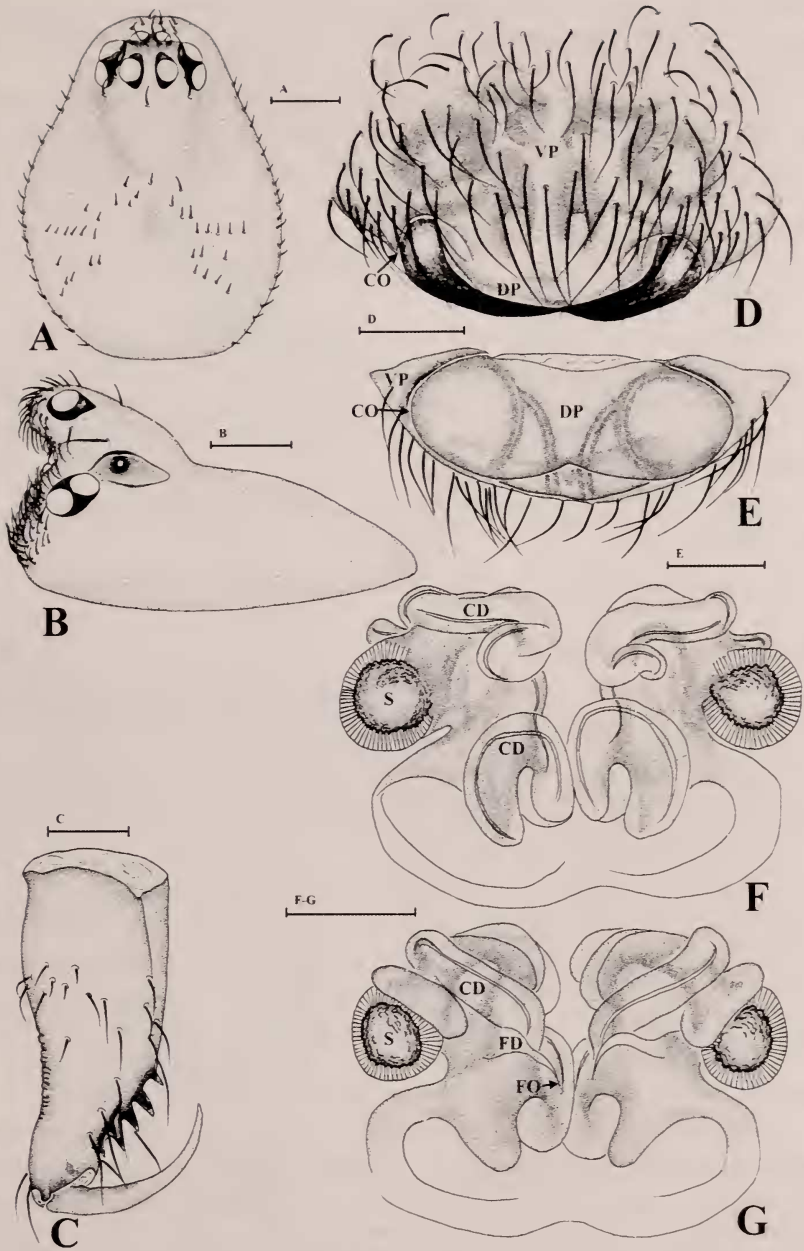


FIG. 2

Walckenaeria asymmetrica sp. n.; male holotype (B, C) and female paratype (A, D-G). (A) Carapace, dorsal view. (B) Same, lateral view. (C) Left chelicera, posterior view. (D) Epigynum, ventral view. (E) Same, posterior view. (F) Vulva, ventral view. (G) Same, dorsal view. Scale lines: A, B=0.2 mm, C-G=0.1 mm.

to width of tibiae. Number of dorsal spines on tibiae of legs I-IV: 1-1-1-1. Leg measurements: I 3.29 (0.98, 0.31, 0.86, 0.69, 0.46); II 3.19 (0.96, 0.30, 0.81, 0.68, 0.45); III 2.76 (0.82, 0.27, 0.68, 0.61, 0.38); IV 3.59 (1.04, 0.27, 0.95, 0.86, 0.46).

Surface of epigynum almost transparent. Posterior margin of dorsal plate lip-shaped and totally exposed in ventral view (Fig. 2D). Copulatory openings long, curved, situated at the junction of dorsal plate and ventral plate (Fig. 2D, E). Copulatory ducts enclosed in a strongly sclerotized and rather complicated capsule, forming a pair of large loops on ventral side (Fig. 2F). Spermathecae globular, separated from each other by 3 times their diameter (Fig. 2F, G). Fertilization ducts very short, mesally situated (Fig. 2G).

ETYMOLOGY: The specific name is an adjective of the Greek noun *symmetria* (= symmetry), combined with the alpha privativum, and refers to asymmetrical male palps of the holotype (IZCAS) and paratype (MHNG). The distal margin of the pro-lateral tibial apophysis of the left palps of both specimens has 4 branches, but the right palp only 3 branches.

DISTRIBUTION: Only known from Baotianman National Nature Reserve in the Henan Province, China.

HABITAT: The spiders were found under dead leaves on the ground.

***Walckenaeria dahaituoensis* sp. n.**

Figs 3-5

HOLOTYPE: IZCAS, without registration number; ♂; China, Hebei Province, Zhangjiakou City, Chicheng County, Dahaituo National Nature Reserve (40.90°N 115.83°E); collected by Q. Wang, Y. Song and G. Zheng; collected on 5.11.2005.

PARATYPES: IZCAS (3♂ 5♀) and MHNG (2♀ 2♂), without registration number; same data as for holotype. – IZCAS, without registration number; 3♂; China, Beijing, Mentougou District, Xiaolongmen Forest Park, alt. 1225m; collected by X. Yu; collected on 21.09.1999.

DIAGNOSIS: The new species is similar to *W. chiyokoae* and *W. asymmetrica* sp.n., but can be distinguished from these two species by the additional rows of hairs at the base of the lateral eyes in males (Fig. 4A), the shape of the male palpal tibial apophyses (Fig. 3E), the strongly curved, distally pointed tailpiece of the embolic division (Fig. 3A), the equally broad lip-shaped extension of the dorsal plate of the epigynum (Fig. 4D) and the different course of the copulatory ducts in posterior view (Fig. 4G). The vulva system is very similar to that of *W. chiyokoae* and *W. asymmetrica*, and females can only be safely identified when collected together with males.

DESCRIPTION OF HOLOTYPE: Total length 2.54. Carapace 1.38 long, 0.86 wide, orange-brown. Head elevated into a very large lobe carrying posterior median eyes; a shallow sulcus running back from behind PLE and containing a small pit anteriorly; 5 long hairs arranged in a line at each base of lateral eye (Fig. 4A, B). Clypeus 0.31 high, slightly swollen and with a patch of weak hairs in the center (Fig. 4A). AME diameter 0.05, ALE 0.07, PME 0.08, PLE 0.08, AME interdistance 0.63 times their diameter, AME-ALE interdistance 1.73 times ALE diameter, PME interdistance 3.08 times their diameter, PME-PLE interdistance 3.08 times PLE diameter. Sternum 0.71 long, 0.64 wide. Coxa IV interdistance 1.06 times their width. Chelicera chestnut-brown, with 4 promarginal and 4 retromarginal teeth. Tibia of leg I 8.60 times longer than deep. Tm

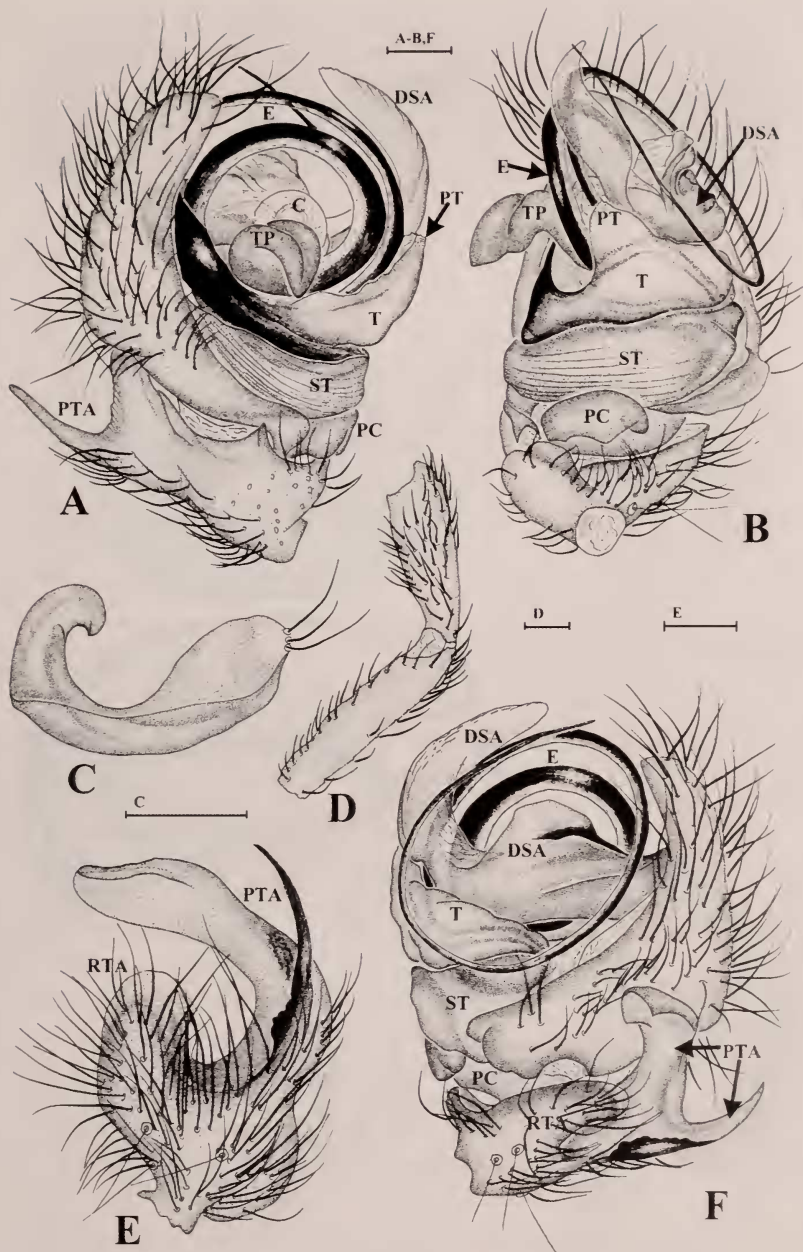


FIG. 3

Walckenaeria dahaituoensis sp. n.; male holotype. (A) Distal part of left palp, proteral view. (B) Same, ventral view. (C) Paracymbium, ventral view. (D) Patella and femur of left palp, retro-lateral view. (E) Tibia of left palp, dorsal view. (F) Distal part of left palp, retrolateral view. Scale lines: 0.1 mm.

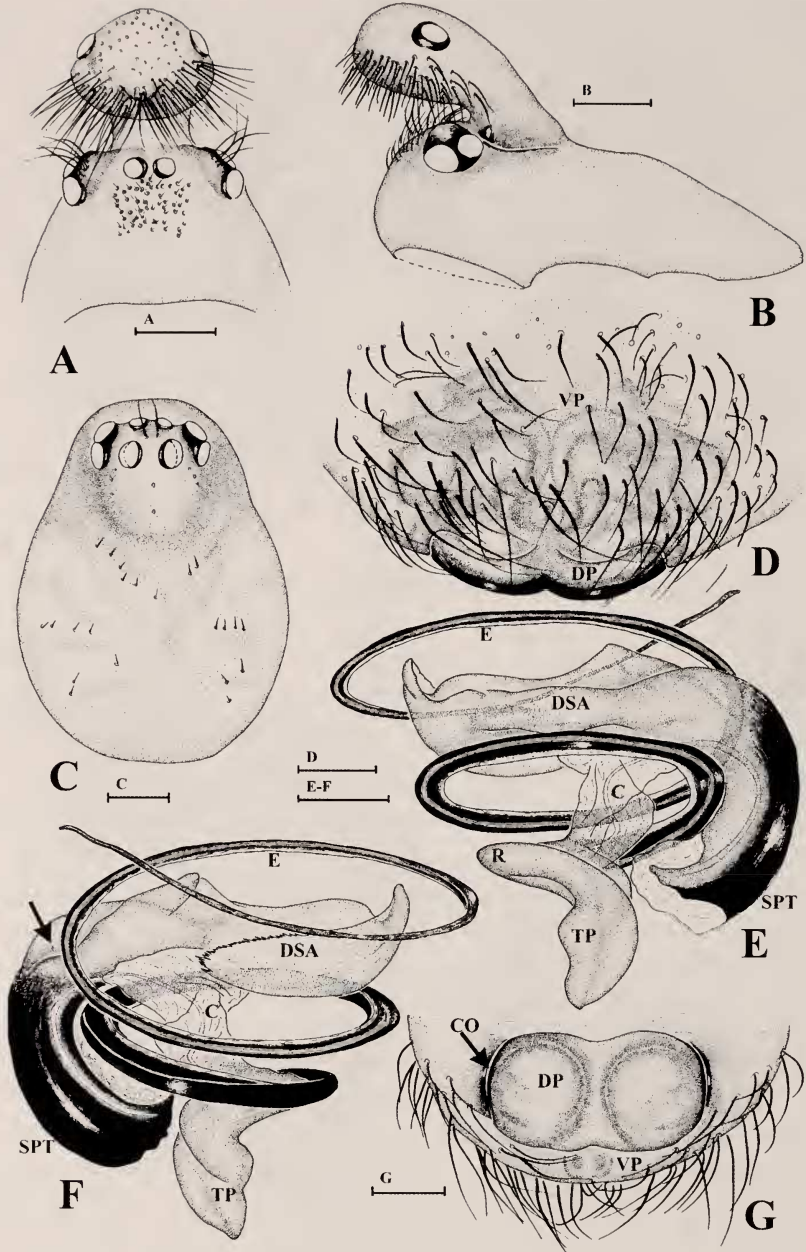


FIG. 4

Walckenaeria dahaituoensis sp. n.; male holotype (A, B, E, F) and female paratype from Dahiatuo N.N.R. (C, D, G). (A) Carapace, frontal view. (B) Same, lateral view. (C) Same, dorsal view. (D) Epigynum, ventral view. (E) Embolic division (with DSA), dorsal view. (F) Same, ventral view (arrow indicating retrolateral groove of supratugulum). (G) Epigynum, posterior view. Scale lines: A-C=0.2 mm, D-G=0.1 mm.

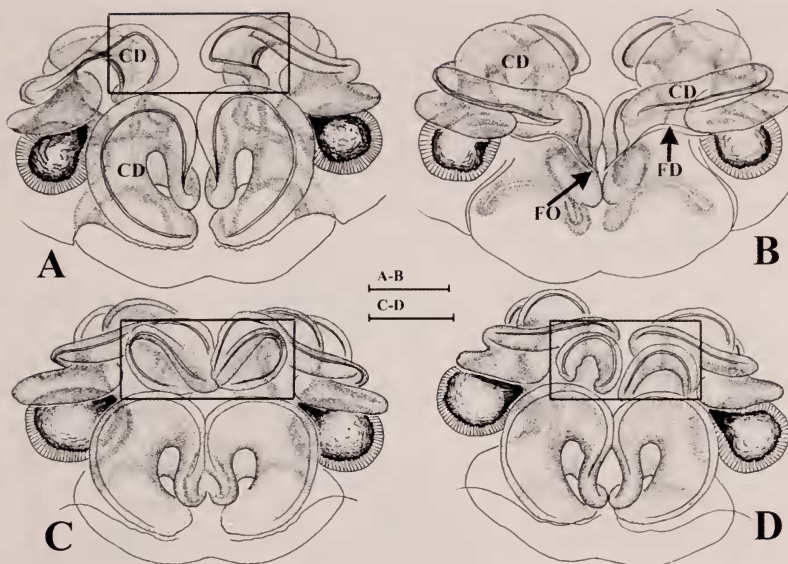


FIG. 5

Walckenaeria dahaituoensis sp. n.; three different female paratypes. (A, C, D) Vulva, ventral view. (B) Same, dorsal view. Scale lines: 0.1 mm.

I 0.59, Tm IV present. Tibiae of all legs with very short spines, one third of width of tibiae. Number of dorsal spines on tibiae of legs I-IV: 1-1-1-1. Leg measurements: I 4.09 (1.14, 0.33, 1.08, 0.95, 0.59); II 3.99 (1.11, 0.33, 1.05, 0.93, 0.59); III 3.31 (0.94, 0.30, 0.81, 0.77, 0.49); IV 4.26 (1.16, 0.31, 1.14, 1.08, 0.57).

Palp: Patella slightly shorter than femur (Fig. 3D). Tibia short, armed with 1 stout retrolateral apophysis and 1 large biforked prolateral apophysis, the latter composed of 1 long broad branch and 1 strongly sclerotized needle-like branch; with 1 prolateral and 2 retrolateral trichobothria (Fig. 3E). Paracymbium C-shaped, slightly hooked, with 3 hairs on the basal arm near its junction with the cymbium (Fig. 3C). Tegulum distal to subtegulum in unexpanded palp (Fig. 3F). Protegulum without papillae (Fig. 3A, B). Distal suprategular apophysis similar to that of *W. chiyokoae* but without small tooth on upper margin of groove (Fig. 3F). Column rounded, totally visible in prolateral view (Fig. 3A). Embolic division (Fig. 4E, F) similar to that of the two above mentioned species, but tailpiece pointed and strongly curved downwards (Fig. 3A).

DESCRIPTION OF FEMALE PARATYPE (from type locality): Carapace (Fig. 4C) unmodified, similar to that of male in coloration. Total length 2.20. Carapace 1.08 long, 0.80 wide. Clypeus 0.23 high. AME diameter 0.06, ALE 0.09, PME 0.08, PLE 0.08, AME interdistance 0.44 times their diameter, AME-ALE interdistance 0.47 times ALE diameter, PME interdistance 1.08 times their diameter, PME-PLE interdistance 0.77 times PLE diameter. Sternum 0.72 long, 0.64 wide. Coxa IV interdistance 1.13 times their width. Chelicera with 4 promarginal and 2 retromarginal teeth. Tibia of leg I 7.27

times longer than deep. Tm I 0.61, Tm IV present. Spines on tibiae of all legs as long as width of tibiae. Number of dorsal spines on tibiae of legs I-IV: 1-1-1-1. Leg measurements: I 3.83 (1.13, 0.34, 1.00, 0.84, 0.52); II 3.68 (1.08, 0.34, 0.94, 0.82, 0.51); III 3.22 (0.93, 0.30, 0.79, 0.75, 0.46); IV 4.09 (1.14, 0.30, 1.12, 1.01, 0.53).

Surface of epigynum almost transparent. Doral plate with evenly broad lip-shaped extension totally exposed in ventral view (Fig. 4D). Vulva system (Fig. 5A, B) similar to that of *W. chiyokoae* and *W. asymmetrica* sp. n.

ETYMOLOGY: The specific name is taken from the type locality.

VARIATION: 7 ♀ and 6 ♂ were measured. The total length varies from 2.58 to 2.64 in males, 2.20 to 2.33 in females. The carapace length is 1.38 to 1.42 in males, 1.08 to 1.22 in females; width 0.86 to 0.88 in males, 0.80 to 0.89 in females. The species shows considerable intraspecific variation in the shape of the anterior part of the vulva (Fig. 5A, C, D).

DISTRIBUTION: Only known from Baotianman Nature Reserve in Henan Province, China.

HABITAT: The spiders were found in the leaf litter of a birch forest.

Walckenaeria ferruginea Seo, 1991

Figs 6-7

Walckenaeria ferruginea Seo, 1991: 36, figs 1-6. Here re-established as a valid species name.

Walckenaeria orientalis (Olgier, 1985): synonymized by Marusik & Koponen (2000: 62).

MATERIAL EXAMINED: IZCAS, without registration number; 2 ♂ 2 ♀; China, Liaoning Province, Qingyuan County (30.10°N 101.75°E); collected by S. Gao; collected on 11.1985. – IZCAS, X98-053; 5 ♀; no other information available.

DIAGNOSIS: *W. ferruginea* is very similar to *W. orientalis*, but males can be distinguished by the shape of their retrolateral tibial apophysis, which is broad and blunt in *W. ferruginea* (Fig. 6D, G), but strongly sclerotized and dentiform in *W. orientalis*; by the modifications along the inner margin of the embolus, which has a large curved lamella near the base of the radix and a small dark triangular apophysis near the tip of the embolus in *W. ferruginea* (Figs 6G, 7E), but a curved rectangular lamella near the base of the radix and a hook near the tip of the embolus in *W. orientalis*; by the strongly curved tailpiece of the radix in *W. ferruginea* (Fig. 6F), which is almost straight in *W. orientalis*. Females can be distinguished by the nearly flat posterior margin of the dorsal plate (in ventral view) in *W. ferruginea* (Fig. 7D), which is protruding in *W. orientalis*; by the presence of a small nick in the middle of the posterior margin of the ventral plate in *W. ferruginea* (Fig. 7D), which is protruding in *W. orientalis*; by the arrangement of the spermathecae, which are parallel in *W. ferruginea* (Fig. 7D), but divergent anteriorly in *W. orientalis*.

DESCRIPTION OF MALE (from Qingyuan): Total length 2.23. Carapace 1.03 long, 0.75 wide, reddish brown, slightly elevated, with a pair of small “horns” directed anterolaterally (Fig. 6 A, B). Clypeus 0.19 high. Abdomen silver grey. AME diameter 0.05, ALE 0.08, PME 0.08, PLE 0.08, AME interdistance 0.40 times their diameter, AME-ALE interdistance 0.46 times ALE diameter, PME interdistance 0.35 times their diameter, PME-PLE interdistance 0.68 times PLE diameter. Sternum 0.64 long, 0.58 wide. Coxa IV interdistance 1.00 times their width. Chelicera with 4 promarginal and

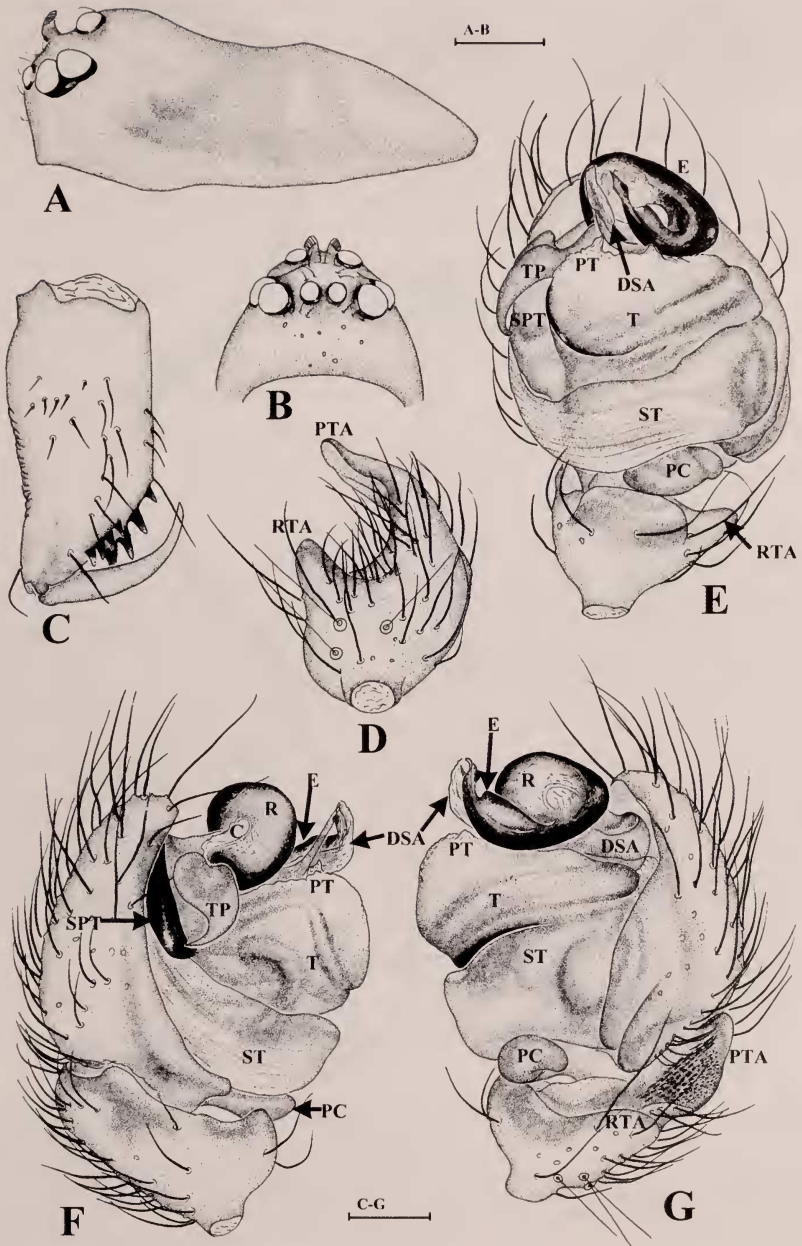


FIG. 6

Walckenaeria ferruginea; male from Liaoning, China. (A) Carapace, lateral view. (B) Same, frontal view. (C) Left chelicera, posterior view. (D) Tibia of left palp, dorsal view. (E) Distal part of left palp, ventral view. (F) Same, prolateral view. (G) Same, retrolateral view. Scale lines: A, B=0.2 mm, C-G=0.1 mm.

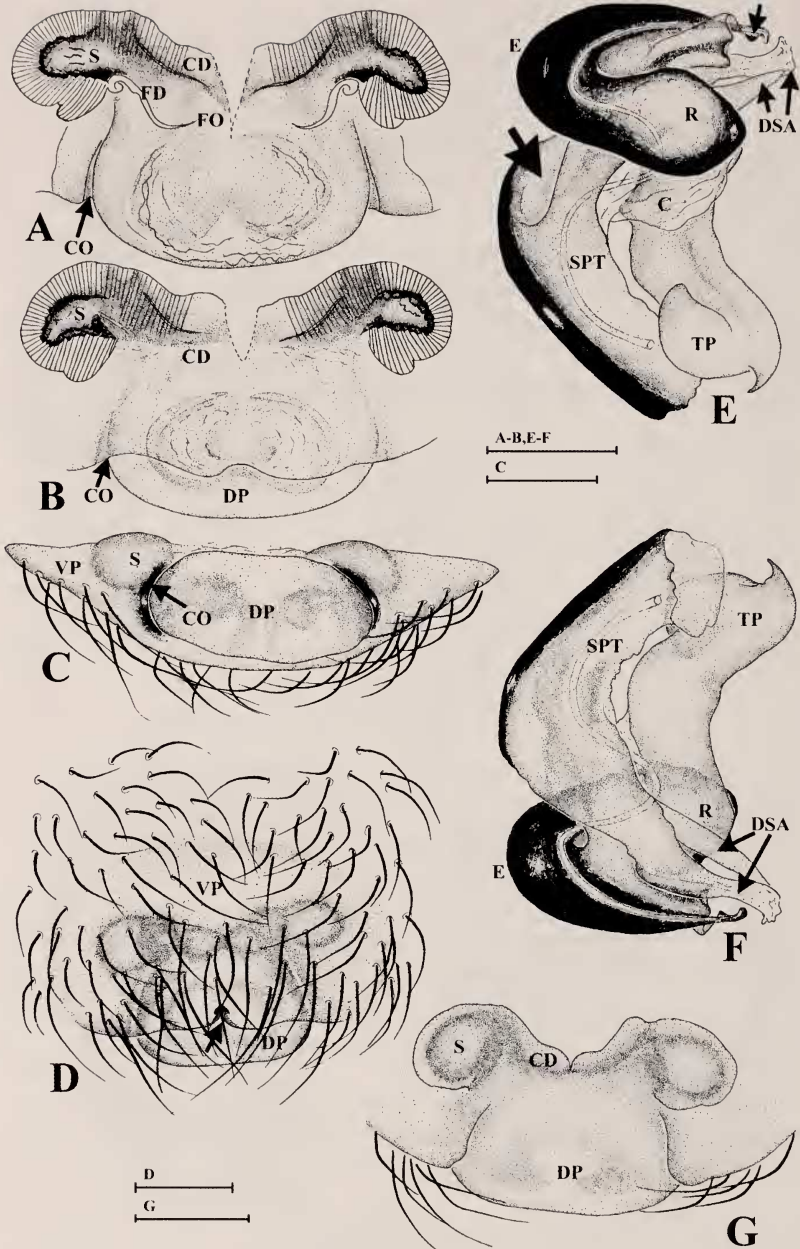


FIG. 7

Walckenaeria ferruginea; male (E, F) and female (A-D, G) from Liaoning, China. (A) Vulva, dorsal view. (B) Same, ventral view. (C) Epigynum, posterior view. (D) Same, ventral view (arrow pointing to nick in middle of posterior margin of ventral plate). (E) Embolic division, ventral view (with DSA; smallest arrow pointing to triangular apophysis near tip of embolus; largest arrow indicating retrolateral groove of suprategulum). (F) Same, dorsal view. (G) Epigynum, dorsal view. Scale lines: 0.1 mm.

4 retromarginal teeth (Fig. 6C). Tibia of leg I 6.55 times longer than deep. Tm I 0.50, Tm IV present. Number of dorsal spines on tibiae of legs I-IV: 2-2-1-1. Leg measurements: I 3.14 (0.91, 0.28, 0.82, 0.68, 0.46); II 2.99 (0.85, 0.28, 0.78, 0.64, 0.44); III 2.58 (0.74, 0.26, 0.63, 0.58, 0.38); IV 3.29 (0.91, 0.26, 0.89, 0.78, 0.46).

Palp: Tibia short, armed with 1 stout retrolateral apophysis and 1 long strongly curved prolateral apophysis with scaly inner surface (Fig. 6G); with 1 prolateral and 2 retrolateral trichobothria (Fig. 6D). Paracymbium C-shaped, terminating in a blunt hook (Fig. 6G). Tegulum distal to subtegulum in unexpanded palp (Fig. 6G). Protegulum extended upwards to form 2 small triangular membranes (Fig. 6E). Suprattegulum distally produced into 1 long pointed apophysis and 1 partly membranous apophysis (Fig. 7F). Embolic division (Fig. 7E, F): radix swollen; embolus very thick, with complicated apophyses along inner margin; tailpiece broad at base, abruptly narrowed to a pointed dorsal-curved apex.

DESCRIPTION OF FEMALE (from Qingyuan): Carapace unmodified, similar to that of male in coloration. Total length 2.52. Carapace 1.14 long, 0.83 wide. Clypeus 0.17 high. AME diameter 0.06, ALE 0.09, PME 0.10, PLE 0.09, AME interdistance 0.21 times their diameter, AME-ALE interdistance 0.20 times ALE diameter, PME interdistance 0.38 times their diameter, PME-PLE interdistance 0.41 times PLE diameter. Sternum 0.71 long, 0.61 wide. Coxa IV interdistance 1.03 times their width. Chelicera with 4 promarginal and 4 retromarginal teeth. Tibia of leg I 6.22 times longer than deep. Tm I 0.48, Tm IV present. Number of dorsal spines on tibiae of legs I-IV: 2-2-1-1. Leg measurements: I 3.43 (1.03, 0.31, 0.88, 0.73, 0.48); II 3.27 (0.98, 0.29, 0.84, 0.71, 0.46); III 2.86 (0.83, 0.29, 0.70, 0.64, 0.39); IV 3.64 (1.02, 0.29, 0.98, 0.88, 0.48).

Epigynum simple. Dorsal plate partly visible in ventral view (Fig. 7D) and elliptical in posterior view (Fig. 7C). Copulatory openings long and narrow, present at junction of dorsal plate and ventral plate. Copulatory ducts enclosed in a simple sclerotized capsule (Fig. 7A, B). Spermathecae somewhat elliptical, separated from each other by about their maximum diameter (Fig. 7G), split visible in anterior part of vulva resulting from damage during dissection (Fig. 7A, B).

VARIATION: 2♂ and 7♀ were measured. Total length varies from 2.23 to 2.38 in males, 2.52 to 3.83 in females.

DISTRIBUTION: Korea, China (Liaoning Province).

Walckenaeria karpinskii (O. P.-Cambridge, 1873)

Figs 8-10

Erigone karpinskii O. P.-Cambridge, 1873: 447, pl. 41, fig. 12.

MATERIAL EXAMINED: IZCAS, without registration number; 5♀ 2♂: China, Hebei Province, Zhangjiakou City, Chicheng County, Dahaituo National Nature Reserve (40.90°N 115.83°E); collected by Q. Wang, Y. Song and G. Zheng; collected on 5.11.2005.

DIAGNOSIS: *W. karpinskii* is similar to *W. clavicornis* and *W. korobeinikovi* Esyunin & Efimik, 1996, but can be distinguished by the shape of the palpal tibia (Fig. 9C, F; cf. Esyunin & Efimik, 1996: fig. 4a-f; Millidge, 1983: figs 261-266) and of the dorsal plate of the epigynum (Fig. 10D, E; cf. Esyunin & Efimik, 1996: fig. 5a-h).

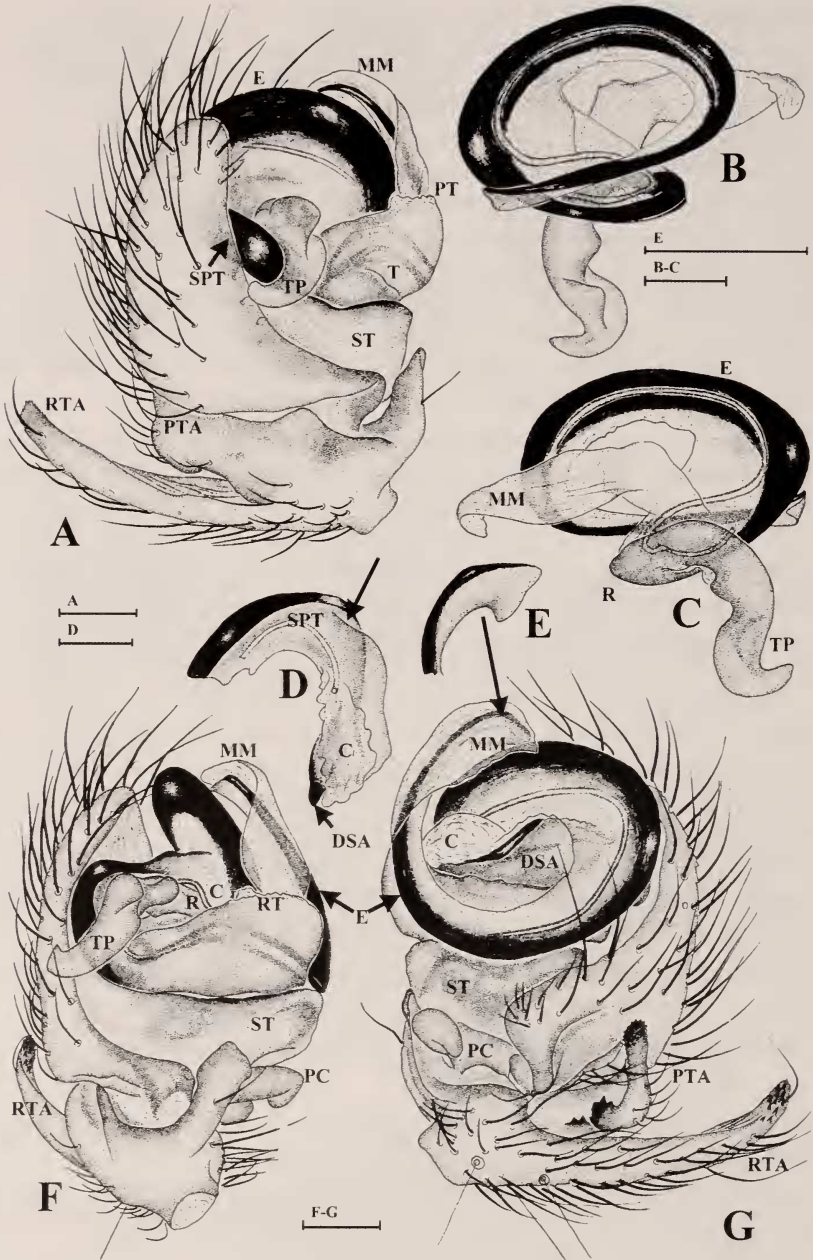


FIG. 8

Walckenaeria karpinskii; male from Hebei, China. (A) Distal part of left palp, prolateral view. (B) Embolic division, ventral view. (C) Same, dorsal view. (D) Distal part of suprategulum, ventral view (arrow indicating retrolateral groove). (E) Distal part of embolus (ventral view). (F) Distal part of left palp, ventral view. (G) Same, retrolateral view. Scale lines: 0.1 mm.

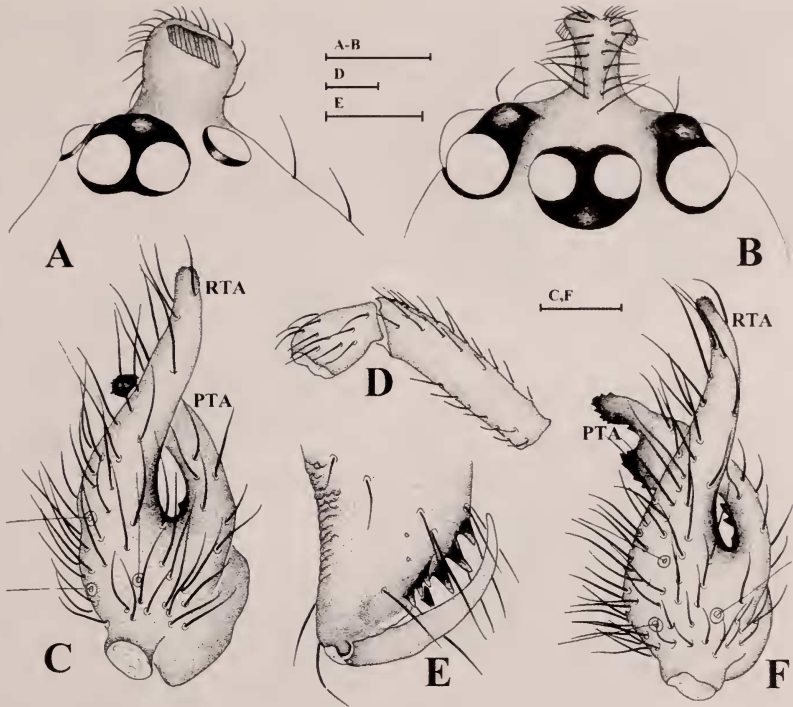


FIG. 9

Walckenaeria karpinskii; male from Hebei, China. (A) Eye region, lateral view. (B) Same, frontal view. (C) Tibia of left palp, dorsomesal view. (D) Patella and femur of left palp, retrolateral view. (E) Left chelicera, posterior view. (F) Tibia of left palp, dorsal view. Scale lines: 0.1 mm.

RE-DESCRIPTION OF MALE (from Dahaituo National Nature Reserve): Total length 2.08. Carapace 0.98 long, 0.71 wide, orange-brown, with a stout horn in ocular area (Fig. 9A, B). Clypeus 0.20 high. AME diameter 0.04, ALE 0.07, PME 0.06, PLE 0.07, AME interdistance 0.46 times their diameter, AME-ALE interdistance 0.38 times ALE diameter, PME interdistance 0.50 times their diameter, PME-PLE interdistance 0.55 times PLE diameter. Sternum 0.58 long, 0.53 wide. Coxa IV interdistance 1.08 times their width. Chelicera chestnut-brown, with 4 promarginal and 3 retromarginal teeth (Fig. 9E). Tibia of leg I 5.37 times longer than deep. Tm I 0.45, Tm IV present. Number of dorsal spines on tibiae of legs I-IV: 2-2-1-1. Leg measurements: I 2.39 (0.76, 0.28, 0.46, 0.50, 0.23); II 2.38 (0.69, 0.27, 0.58, 0.49, 0.35); III 2.06 (0.57, 0.24, 0.47, 0.44, 0.34); IV 2.79 (0.78, 0.25, 0.72, 0.63, 0.41).

Palp: Patella length half of femur length (Fig. 9D). Tibia short, armed with 2 well-developed apophyses; retrolateral apophysis long, slightly curved, decorated interiorly with some inconspicuous teeth (Fig. 8F, G); prolateral apophysis biforked, strongly sclerotized, serrated distally (Fig. 9F); with 1 prolateral and 2 retrolateral trichobothria. Paracymbium C-shaped, with distal end hooked (Fig. 8G). Tegulum distal to subtegulum in unexpanded palp (Fig. 8F). Protegulum relatively flat (Fig. 8F). Suprattegulum (Fig. 8D) terminating in strongly sclerotized point, this not visible in

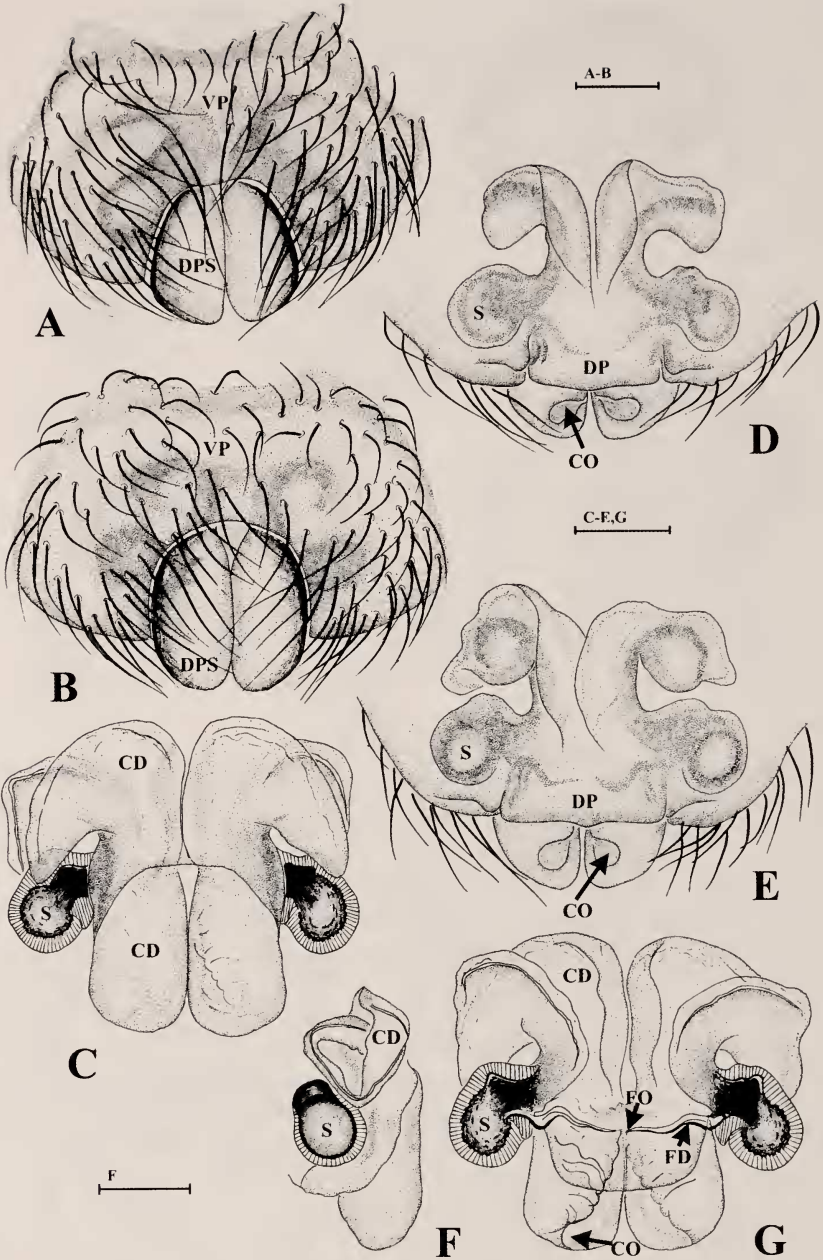


FIG. 10

Walckenaeria karpinskii; two females from Hebei, China. (A, B) Epigyna, ventral view. (C) Vulva, ventral view. (D, E) Epigyna, dorsal view. (F) Vulva, lateral view. (G) Same, dorsal view. Scale lines: 0.1 mm.

unexpanded palp. A suprategular groove visible in unexpanded palp in retrolateral view (Fig. 8G). Embolic division: median membrane long and broad, enveloping distal end of long coiled embolus (Fig. 8B, C, G); tailpiece relatively short, strongly curved upwards, in prolateral view with a rounded piece extended upwards from anterior margin (Fig. 8A); embolus very broad at base, gradually narrowed towards the end, slightly sclerotized along inner margin (Fig. 8E, G).

RE-DESCRIPTION OF FEMALE (from Dahaituo National Nature Reserve): Carapace unmodified, similar to that of male in coloration. Total length 2.22. Carapace 1.09 long, 0.77 wide. Clypeus 0.17 high. AME diameter 0.04, ALE 0.07, PME 0.06, PLE 0.07, AME interdistance 0.36 times their diameter, AME-ALE interdistance 0.38 times ALE diameter, PME interdistance 0.60 times their diameter, PME-PLE interdistance 0.47 times PLE diameter. Sternum 0.66 long, 0.55 wide. Coxa IV interdistance 1.07 times their width. Chelicera with 5 promarginal and 5 retromarginal teeth. Tibia of leg I 3.96 times longer than deep. Tm I 0.51, Tm IV present. Number of dorsal spines on tibiae of legs I-IV: 2-2-1-1. Leg measurements: I 2.48 (0.75, 0.29, 0.59, 0.49, 0.35); II 2.36 (0.70, 0.28, 0.55, 0.47, 0.36); III 2.06 (0.61, 0.26, 0.45, 0.43, 0.31); IV 2.78 (0.78, 0.28, 0.73, 0.61, 0.39).

Dorsal plate of epigynum with 2 large linguiform scapes (Fig. 10A, B). Copulatory openings present at posterior end of linguiform scapes (Fig. 10D, E). Copulatory ducts enclosed in a sclerotized capsule, broad and wavelike at first (Fig. 10G), then continuously broadening into a pair of wide extensions with outer margin extended posteriorly (Fig. C, G), narrowing abruptly before entering into globular spermathecae (Fig. 10F, G). Fertilization ducts situated mesally (Fig. 10G).

VARIATION: 5 ♀ and 2 ♂ were measured. Total length varies from 2.08 to 2.15 in males, 2.22 to 2.45 in females. Carapace length is 0.95 to 0.98 in males, 1.09 to 1.11 in females; width 0.69 to 0.71 in males, 0.77 to 0.78 in females. The species shows intraspecific variation in the shape of dorsal plate scape (Fig. 10A, B) and the anterior part of the vulva (Fig. 10D, E).

DISTRIBUTION: Holarctic. In China it was recorded in the provinces of Hebei and Jilin (Song et al., 1999).

HABITAT. The spiders were found in the leaf litter of a birch forest and a pine forest.

Walckenaeria yunnanensis Xia, Zhang, Gao, Fei & Kim 2001

Figs 11-13

Walckenaeria yunnanensis Xia et al., 2001: 163, figs 8-13.

PARATYPES: JLU, without registration number; 1 ♂ 6 ♀; China, Yunnan Province, Dali City, Hudiequan Park (25.0°N 102.7°E); collected by J. Gao; collected on 26.07.1983.

DIAGNOSIS: This species has a well-developed lamella but no tailpiece on the male palp (Figs 11A, 12D). Palpal protégulum with 2 conspicuous membranous apophyses (Fig. 11C). Distal suprategular apophysis rather robust basally, with several deep grooves on the basal inner side. Base of the embolic division unique, with 2 membrane conspicuous apophyses (Fig. 12D). Cymbium with a large retrobasal process (Fig. 11D). In addition, the shape of female capsule, where the copulatory ducts are

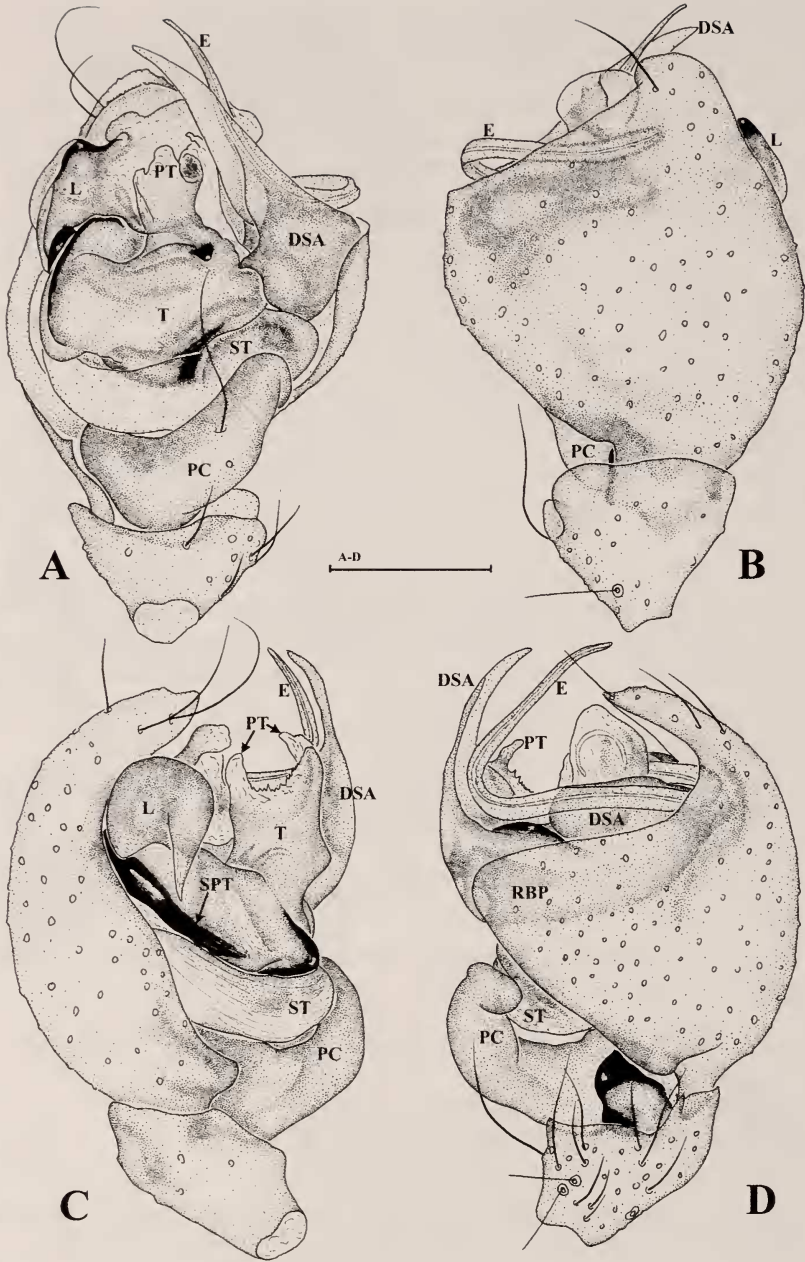


FIG. 11

Walckenaeria yunnanensis; male paratype. (A) Distal part of left palp, ventral view. (B) Same, dorsal view. (C) Same, prolateral view. (D) Same, retrolateral view. Scale lines: 0.2 mm.

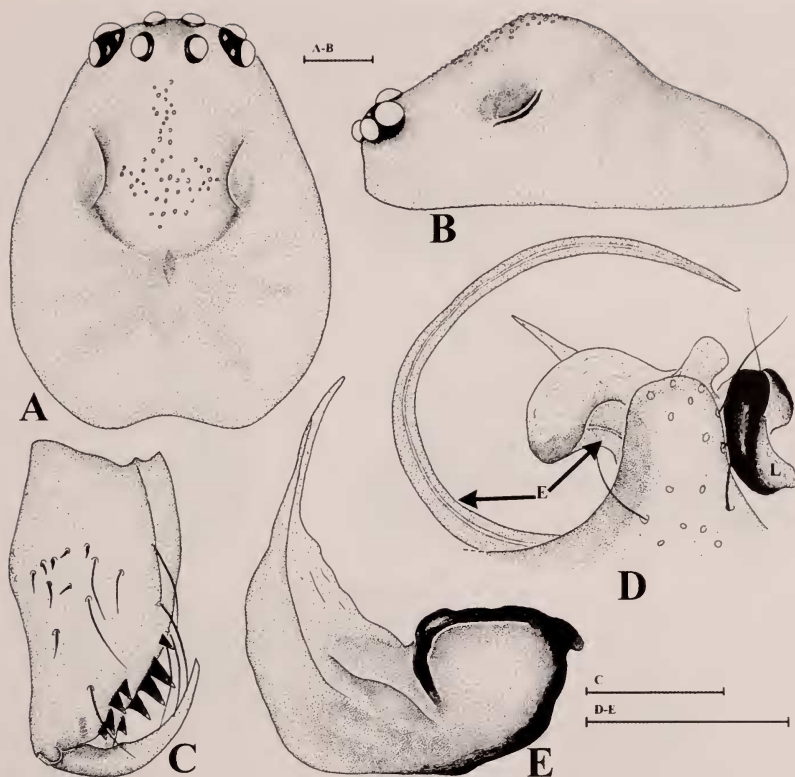


FIG. 12

Walckenaeria yunnanensis; male paratype. (A) Carapace, dorsal view. (B) Same, lateral view. (C) Left chelicera, posterior view. (D) Distal part of left palp, anterior view. (E) Distal part of supratégulum, retrolateral view. Scale lines: 0.2 mm.

embedded, is significantly different from known *Walckenaeria* species (Fig. 13A, B, F). Consequently *W. yunnanensis* can be very easily distinguished from other known *Walckenaeria* species.

RE-DESCRIPTION OF MALE PARATYPE: Carapace 1.24 long, 0.96 wide, orange-brown, raised into a large hump in the middle of the thoracic part, as well as 2 shallow sulci on both sides of the hump (Fig. 12A, B). Clypeus 0.22 high. AME diameter 0.08, ALE 0.07, PME 0.08, PLE 0.08, AME interdistance 0.56 times their diameter, AME-ALE interdistance 0.62 times ALE diameter, PME interdistance 1.04 times their diameter, PME-PLE interdistance 0.35 times PLE diameter. Sternum 0.64 long, 0.64 wide. Coxa IV interdistance 1.23 times their width. Chelicera with 5 promarginal and 4 retromarginal teeth (Fig. 12C). Leg I and leg III missing. Tm IV present. Number of dorsal spines on tibia of leg IV: 2-2-1-1 (see Xia et al., 2001). Leg measurements: I missing; II 3.76 (1.13, 0.28, 0.91, 0.88, 0.57); III missing; IV 3.62 (1.06, 0.28, 0.91, 0.91, 0.45).

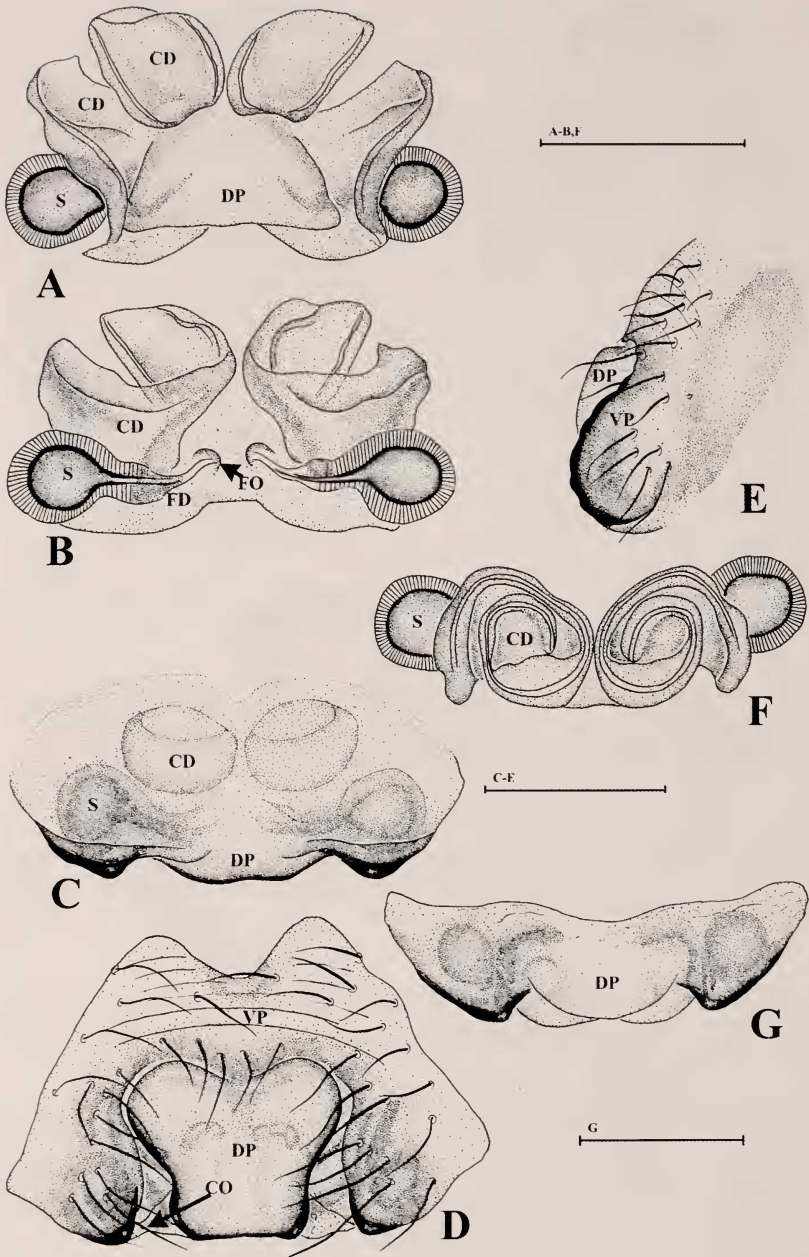


FIG. 13

Walckenaeria yunnanensis; female paratype. (A) Vulva, ventral view. (B) Same, dorsal view. (C) Epigynum, dorsal view. (D) Same, ventral view. (E) Same, lateral view. (F) Vulva, anterior view. (G) Epigynum, posterior view. Scale lines: 0.2 mm.

Palp: Tibia short, with reduced distal apophysis (Fig. 11A-D); with 1 prolateral and 2 retrolateral trichobothria (Fig. 11D). Paracymbium with strongly sclerotized black base and blunt, slightly hooked apex (Fig. 11D). Cymbium with distinct retro-basal process (Fig. 11D). Tegulum distal to subtegulum in unexpanded palp (Fig. 11A). Protegulum well developed (Fig. 11A, C). Distal suprategular apophysis robust basally and gradually narrowing towards the tip (Fig. 12E), with several deep grooves on basal inner side. Embolic division: lamella large, widened distally (Fig. 11C); base of the embolic division membranous, with 2 conspicuous apophyses distally (Fig. 12D); tailpiece absent (Fig. 12D); embolus broad, forming a long, wide coil (Fig. 12D).

RE-DESCRIPTION OF FEMALE PARATYPE. Carapace unmodified, similar to that of male in coloration. Carapace 1.19 long, 0.94 wide. Clypeus 0.16 high. AME diameter 0.08, ALE 0.11, PME 0.08, PLE 0.09, AME interdistance 0.32 times their diameter, AME-ALE interdistance 0.29 times ALE diameter, PME interdistance 0.81 times their diameter, PME-PLE interdistance 0.40 times PLE diameter. Sternum 0.61 long, 0.61 wide. Coxa IV interdistance 1.24 times their width. Chelicera with 4 promarginal and 5 retromarginal teeth. Tibia of leg I 8.17 times longer than deep. Tm I 0.58, Tm IV absent. Number of dorsal spines on tibia of leg IV: 2-2-1-1. Leg measurements: I 3.71 (1.09, 0.28, 0.92, 0.86, 0.56); II 3.41 (0.96, 0.28, 0.83, 0.79, 0.54); III 2.88 (0.86, 0.27, 0.62, 0.67, 0.46); IV 3.54 (1.03, 0.26, 0.88, 0.86, 0.52).

Dorsal plate totally exposed in ventral view (Fig. 13D) and a bit swollen in lateral view (Fig. 13E). Copulatory openings triangular, present between dorsal and ventral plate (Fig. 13D). Copulatory ducts enclosed in a slightly sclerotized spiral capsule (Fig. 13A, B, F). Spermathecae globular, separated from each other by a distance of more than 2 times their diameter (Fig. 13G). Fertilization ducts short, situated mesally (Fig. 13B).

VARIATION. 5 ♀ were measured. Carapace length varies from 0.91 to 1.22 and width 0.78 to 0.94.

REMARK. *W. yunnanensis* occupies an isolated position within *Walckenaeria* and may need to be separated into a distinct genus when similar new species are discovered.

DISTRIBUTION. Hudiequan in Yunnan Province.

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